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prejudiced appeals or unreasoning denunciation. Patient investigation, keeping in view all circumstances of the question, and avoiding all one-sidedness in considering the matter, will alone bring about the object desired. Personally I at present occupy the same stand-point as Professor Armsby (*Science*, x. p. 4), "Much of the common prejudice against the use of distillery-slops appears to be occasioned by their irrational application, and frequently by the filthy surroundings of the animals, rather than by any thing injurious in the feeding-stuff itself." GEORGE H. ROHÉ.

Baltimore, July 15.

#### The Hudson Bay Route.

IN your article on 'The New Route from England to Eastern Asia, and the Hudson Bay Route' (Vol. x. No. 231), you show the advantages offered by the Hudson Bay route, as the most direct available line between Yokohama and Liverpool in connection with the Canadian Pacific Railway and their line of steamers between Yokohama and Vancouver. I should like to add a few remarks on that part of it known as the Hudson Bay route.

The Canadian Government decided, that, before any such line was encouraged by subsidy, it would be advisable to determine by actual observation what difficulties were likely to be met with; and, with this object in view, established several observing stations in the Strait and Bay, with men and material sufficient for continuous residence there during 1884-6. Complete details of these observations are published in the annual reports of the Marine Department.

A fact well established by these observations was that navigation was limited in these years to three months for the ordinary ocean-steamer; and that for a class of steamer specially constructed to withstand the lateral thrust of the ice, and to push her way amidst the outflowing arctic ice, four, or at most five months would be the limit, depending on whether the season was a late or early one. We must not forget, however, that in the earlier days at least of this route, before the telegraph and cable will have reached these waters, steamers will not attempt the passage at these earlier dates, fearing an arrival off the mouth of the Strait and an inactive wait for a late season's opening, so that practically such an advantage would be lost, and two months and a half become the period over which a steamer could be certain of making an uninterrupted passage during any season.

In considering the possibility of the route being equipped with a special class of steamer, we will have to remember that the required conditions will be strength and power rather than speed, and that therefore their field for employment outside of these few months' service would be of very limited extent.

The special objection I would point out as to this route, apart from the ice-question, is the difficulty of the passage itself: an unknown, an unlighted coast-line, with very few harbors of refuge, or none at all, and very little room to ride out a gale; extreme depths of water, one hundred fathoms being often found right up to the shore, with generally very foul holding-ground where the depths are more moderate. In foul weather, no sounding being possible that would be of value, a vessel would receive no warning of her proximity to the coast until the information would be of little or no avail.

Although fogs are of less frequent occurrence than off the Newfoundland coast, where the necessary conditions are most favorable, they are not infrequent during the season of navigation, Belle-Isle having an average of 1,600 hours fog during the year, as compared with 420 for the Strait during the same period. On the other hand, although the total amount of precipitation, in the Strait, was not great, rain or snow fell on an average of a little more than every other day, with its attendant thick weather.

In addition to and connection with these difficulties, we must not forget that the proximity of the Strait to the Magnetic Pole results in the horizontal, or directive, force of the magnetic-needle being so diminished that the common compass is perfectly useless; and even in the case of the Thomson compass, disturbing elements on ship-board have, in consequence, their values so increased (relatively) that sources of error might arise, the effects of which could not be counted on during thick weather.

That the people of Manitoba are seemingly satisfied with the feasibility of this route, there can be no doubt, if we may judge from the advance they have made with the construction of the railway from Winnipeg to Churchill; but, in face of the facts obtained from the observations made in the Strait, one must conclude that the resources of Hudson Bay itself and the country intervening are looked upon as reason sufficient for the construction, independently of the value of the road as a connecting link to the Hudson Bay route.

In conclusion, although it would be difficult to say that, with the appliances science is constantly developing to meet particular cases of difficulty, the navigation of Hudson Strait will not be possible for five or six months when the necessity arises, we cannot but conclude that, with the means at our disposal to-day, the navigation of Hudson Strait is possible for such a limited period, and under such serious disadvantages, that as a development of the 'New Route from England to Eastern Asia' we need not consider it as an immediate probability.

W. A. ASHE.

The Observatory, Quebec, July 16.

#### The Wanton Destruction of the Florida Heronries.

CANNOT general legislation, cannot State legislation, or cannot somebody raise a hand to stay the terrible, the shameless extermination of the herons at their breeding-grounds in the south-western parts of the State of Florida?

As I pen these lines this murderous work is being actively carried on, and apparently in the most lawless and reckless manner possible,—a disgrace to the entire country,—for one of America's grandest and most interesting natural features, her heronries, are simply, and without a check of any kind, being ruthlessly wiped out of existence. Prompted by an insatiable greed for gain, the 'plume-traders' of the markets are upon their grounds in numbers, and hundreds of these birds are now daily falling to their unceasing fire, simply that they may have their backs robbed of a few feathers to gratify a passing fashion. *The Auk* is now publishing an admirable series of articles on this subject from the able pen of Mr. W. E. D. Scott, at present on a scientific expedition in Florida, and I have just read his contribution to the July number of that journal. Mr. Scott has very recently made camp at a number of these heronries, and I quote a few of his words in order to show what work is going on there. At Matlacha Pass, near Charlotte Harbor, Pine Island has a heronry, and here one Johnson was at work. "A few herons were to be seen from time to time flying to the island, and presently I took the small boat, and went ashore to reconnoitre. This had evidently been only a short time before a large rookery. The trees were full of nests, some of which still contained eggs, and hundreds of broken eggs strewed the ground everywhere. Fish-crows and both kinds of buzzards were present in great numbers, and were rapidly destroying the remaining eggs. I found a huge pile of dead, half-decayed birds, lying on the ground, which had apparently been killed for a day or two. All of them had the 'plumes' taken, with a patch of the skin from the back, and some had the wings cut off; otherwise they were uninjured. I counted over two hundred birds treated in this way." In some places, Mr. Scott found hundreds of the young herons just starving in their nests; in others, the gunners beneath the trees shooting down the magnificent birds in hundreds, stripping their backs, and leaving their carcasses to rot upon the ground. Instances were noted without number where, during the breeding-season, the poor, affrighted survivors were driven to strange islands, dropping their eggs in quantities from the trees where they fearfully roosted for the night. A few more years, one or two at the most, and this disgraceful murder will cease, for the simple reason that there will no more victims for the murderers to prey upon,—and in the name of nature, and in the name of the shadows of the sweet old romances that have come down to us of the heronries of history, are these timid, and most engaging of all our larger water-fowl, our own American herons, to be destroyed in this manner!

Twenty years ago southern Florida was the site of the grandest heronries in all the world, and to-day this State is making enviable progress, and many cultured people are flocking to her for a permanent home: is she to stand idly by and watch what will surely

be one of her greatest natural attractions stamped out in a few months under her very eyes, — a work, that, when fully known, as it will surely be, will pass down as one of the blackest pages in her history? A quarter of a century ago the writer was at Charlotte Harbor himself, and well do I remember my unbounded enthusiasm as my eyes first feasted upon the sight of a Floridian heronry: many, many, species, represented by thousands upon thousands of individuals, were ranged along the beaches, or covered the cypress tops, where their nests were in hundreds. Never shall I forget their lovely uniforms as they glistened in the soft atmosphere of that sub-tropical land: some were snowy white, others a charming blue, or warm chestnut, while, more beautiful than all, the wondrous rosy tints of the spoonbills fairly shone in the bright sunlight.

Really I am sad as I see, only too vividly in my mind, the disgusting slaughter that is now being perpetrated in their very midst. Entire rookeries have been exterminated, and others reduced to a few, very few, pairs of birds, now so wild and suspicious that it requires the skill of the rifleman to capture them.

R. W. SHUFELDT.

Fort Wingate, N.Mex., July 14.

#### Tornado 'Power.'

REFERRING to a communication by H. Allen Hazen, in *Science* of July 8, entitled 'Theoretical Meteorology,' in which he states that "theoretical meteorology most signally fails in its attempts to explain our most violent storms and tornadoes," and, "that the theory that the sun's heat could start a vertical current, which, with the condensation of moisture in the upper atmosphere would give rise to winds of 200 to 300 miles per hour seems incredible," and "that the attempt to meet the difficulties by suggesting 'great contrasts in temperature,' 'meeting of warm southerly and cold northerly winds,' etc., does not seem at all satisfactory," I would say that there appears to be a disposition on the part of writers on scientific subjects, more particularly as relates to meteorology, to sacrifice common-sense reasoning and probable facts to profound but improbable theories, which, while they do, and are probably intended to, fill the common mind with wonder at such amazing displays of learning, are unsatisfactory and worthless from a practical scientific standpoint.

The attempt to prove that wind-velocity constitutes the 'power' of tornadoes always did and always will signally fail; nor will it be possible to convince any one who possesses a knowledge of meteorology, that air-currents can be made to attain the several-thousand-mile per hour velocity which would be required to effect the results of tornado action. It is evident to the practical mind that the suggestions referred to by Professor Hazen do not meet the difficulties involved in explaining the violent character of these phenomena, and it is equally evident that more satisfactory suggestions concerning them have not been brought to, or received, his intelligent attention.

It has been claimed and shown that the 'power' of tornadoes is electrical, and it has been demonstrated that trees and twigs which had been subjected to their action bore conclusive proof of this fact. It is not known, however, that theories have been advanced in explanation of the processes whereby the electric fluid is so largely collected within the tornado-funnel, and herein is embodied the object of this communication.

The meeting of warm southerly and cold northerly winds, in the southern quadrants of low-barometer areas, occasions great contrasts in humidity and temperature in a limited area, and it is well known that these conditions are essential to a storm's development and existence. Tornadoes and local storms are, in all instances, subsidiary to extensive storm-systems, and invariably occur at the point where, in accord with the laws governing the circulation of wind in low-barometer areas, the warm and cold currents are brought into opposition. A natural result of the meeting of warm and cold masses of air would be the elevating of the former to higher altitudes, if for no other reason than on account of their relative specific gravity: the ascending currents would, on attaining a proper elevation, precipitate their moisture, and the continual and large inpouring of these opposing currents, in any given locality, would intensify the elements of disturbance. It is conceded that

the angle of contact of air-currents, to the south-eastward of the centres of general storms, contributes to impart a rotary movement, and ascending warm-air currents would naturally assume that motion; and, in the case of tornadoes and local storms, this whirl is most marked at a distance from the earth's surface, or at the point where the moisture in the ascending air is precipitated. That this mass of revolving air is well charged with electricity is shown by the heavy electrical discharges which are commonly observed within its body and in its immediate vicinity. When, through its whirling motion, or the electrical attraction offered by the earth, the extremity of this generally low-lying cloud descends to the earth's surface, there is formed a column of very moist air extending from earth to cloud; and, as moist air is one of the best known conductors of electricity, and the earth is the great reservoir for the electric fluid, the tornado-funnel furnishes the medium of communication by means of which the fluid may leave the earth, and the collecting of vast quantities of both positive and negative electricity within such confined limits would naturally give rise to tremendous exhibitions of its power.

Every observable feature of tornadoes shows them to be electrical storms developed under unusually well-marked conditions. Their action and results are essentially electric, but until the true nature and composition of their mysterious element is known, the exact formula of its action as the destructive agent of local storms cannot be presented. We only know that under certain conditions it will produce certain results. Its presence in tornadoes, in enormous quantities, is shown, and its accountability for the destructiveness of these energetic phenomena is claimed, to the almost total exclusion of the wind-velocity theory, which is not only an improbable, but, it is perfectly safe to say, an impossible one. This is a fundamental proposition established by actual results on the spot where the 'power' of these storms has manifested itself, and is deserving of more consideration than has heretofore been accorded it.

E. B. GARRIATT.

Signal Office, Washington, July 15.

#### Theoretical Meteorology.

THERE is no contradiction whatever between page 51 and page 328 of 'Recent Advances in Meteorology.' My mind, also, remains entirely unchanged with regard to the other matters in the book referred to, by Mr. Hazen, in *Science* of July 8. There are, however, some other parts of the work, which, after a lapse of nearly three years since the first writing, I would be disposed to amend, and even in some cases correct, in a second writing. This it is proposed to do in a forthcoming more popular work, so far as it shall cover the same ground.

W. FERREL.

Kansas City, July 13.

#### Queries.

10. ROBIN'S NEST. — Is there any thing unusual in a robin's nest built inside of a last year's nest, which in turn was built inside of a nest now two years old, and that one inside of one three years old, and so on, like the house that Jack built, until you have a pile of nests fitting into one another and numbering ten? Such a ten-storied affair was found in Potsdam, N.Y., lately, the top story being in use, while beside it on the same window-cap was another pile of three nests.

C. H. LEETE.

11. LAKE ITASCA. — There is one point in the controversy about the name of Lake Itasca, of which I have often thought, but to which I have not seen public attention directed. The priest who is said to have suggested the name is represented to have been a Latin scholar, and to have proposed a name which is intended to signify the 'true source,' *ver(itas ca)put*. Now, I have never been able to see how the words correspond to the idea. *Caput* will do for 'source;' but *veritas* is a noun and nothing else. The two nouns cannot, therefore, mean what they are represented to mean, or the Latin is not that of a classical scholar. *Verum caput* might mean the 'true source,' not, however, *veritas caput*. If there is any other explanation of the case than that the good priest was caught napping in his Latin, I should like to see it in print.

C. W. SUPER.

Athens, O., July 11.